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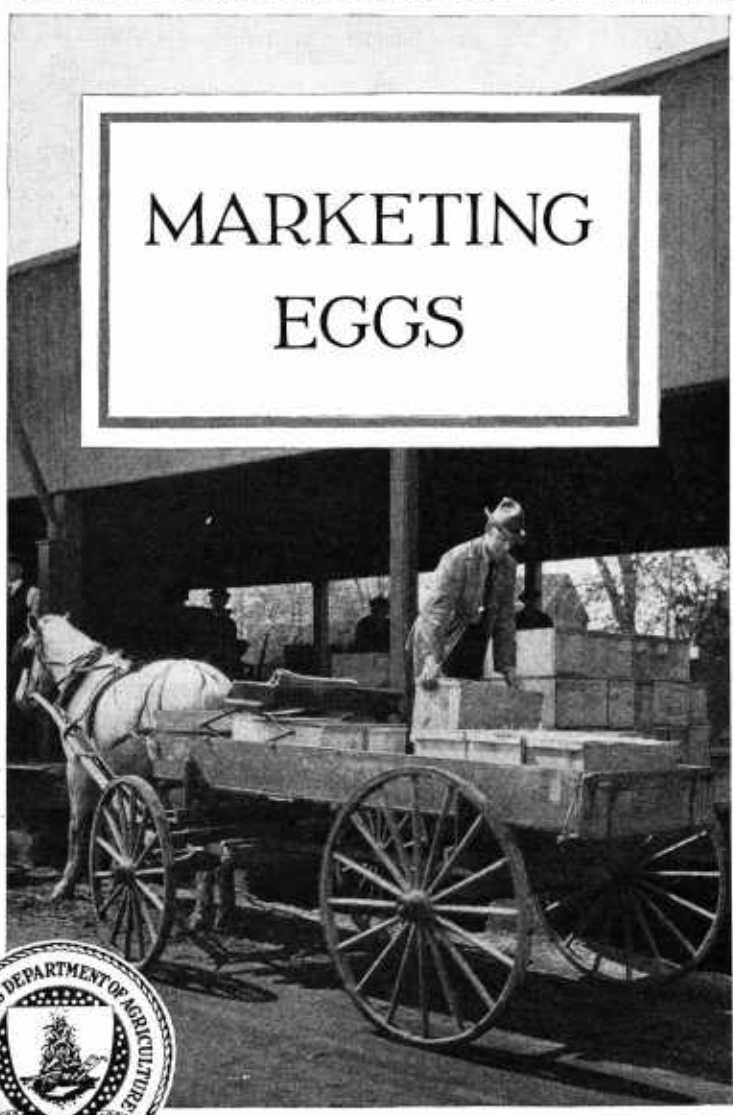
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FARMERS' BULLETIN No. 1378
Nov. 1932

MARKETING
EGGS



THE EGG

Quality is the great factor in market value.

A good market egg requires—

Good production methods on the farm.

Good handling methods during its journey to market.

Speed of movement from the nest to the consumer.

The best method of marketing for each producer depends upon—

Volume of egg production.

Proximity to consuming centers.

Shipping facilities.

Cost of transportation service.

Available buying or marketing agencies.

Time and labor costs of preparation and delivery.

Washington, D. C.

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MARKETING EGGS

By ROB R. SLOCUM, *Senior Marketing Specialist, Division of Dairy and Poultry Products, Bureau of Agricultural Economics*

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MORE THAN 5,000,000 farms in the United States, including a large majority of the farms in every State, produce eggs. On most of these farms egg production is a side line, and the surplus available for market is small, but the total surplus of these farms is sufficient to supply the needs of an urban population of about 69,000,000 people.

Chicken eggs produced on farms in the United States in 1929 numbered 2,689,727,861 dozen and were valued at \$799,261,156.

WHERE EGGS ARE PRODUCED

Specialized poultry farms, on which the production of market eggs is the chief activity, are much less numerous than are farms with general farm flocks. Specialized egg farms are located in greatest numbers along the Atlantic coast in close proximity to the great consuming centers, and along the Pacific coast where climatic conditions are especially favorable. They are found in smaller numbers close to large cities and scattered generally throughout all of the United States. Because such farms are fewer, their total egg production is much lower than that of general farms. (Fig. 1.)

There are areas of intensive egg production in the East and on the Pacific coast but the greater supply is produced in the eastern North Central and western North Central States. According to the census for 1929, Iowa led with an annual production of 188,335,897 dozen and was followed in order by Missouri, California, Texas, Illinois, Ohio, Kansas, Pennsylvania, Minnesota, and Indiana. Not only do the Middle Western States produce more eggs, but because of a smaller urban population they have a greater surplus for shipment

to eastern markets. The origin of eggs received in the New York, Chicago, Philadelphia, Boston, and San Francisco markets (Table 1) clearly indicates the importance of each State as a surplus producer of eggs. (Fig. 2.)

TABLE 1.—Number of cases of eggs received at the five principal markets from different States during 1931¹

[A carload of eggs consists of approximately 400 cases]

Origin	Cases of eggs received at—					
	New York	Chicago	Philadel- phia	Boston	San Fran- cisco	Total
Arkansas.....	6,082	911	2,247	2,059	—	11,299
California.....	589,414	72,759	96,808	14,070	729,426	1,502,477
Colorado.....	4,056	6,756	—	—	—	10,812
Connecticut.....	4,644	—	—	671	—	5,315
Delaware.....	28,949	—	23,906	3	—	52,258
Idaho.....	204,310	2,573	2,303	—	1,768	210,954
Illinois.....	704,196	127,055	187,326	191,467	—	1,210,044
Indiana.....	386,741	12,747	34,522	100,747	—	534,757
Iowa.....	1,354,037	959,381	153,805	323,418	—	2,790,641
Kansas.....	254,630	294,907	101,184	211,320	1,143	863,184
Kentucky.....	24,350	741	2,953	80	—	28,124
Maine.....	—	—	—	44,970	—	44,970
Maryland.....	35,639	—	32,929	13	—	68,581
Massachusetts.....	1,102	—	9,204	—	—	10,306
Michigan.....	80,122	12,825	69,407	47,083	—	209,437
Minnesota.....	353,137	778,226	227,257	229,413	—	1,588,033
Mississippi.....	—	45	1,236	502	—	1,783
Missouri.....	327,781	555,090	207,470	79,901	—	1,170,242
Montana.....	1,889	194	—	400	—	2,483
Nebraska.....	273,318	339,952	36,843	117,246	—	767,359
Nevada.....	—	—	—	—	120	120
New Hampshire.....	—	—	—	24,005	—	24,005
New Jersey.....	232,467	—	5,919	497	—	238,883
New York.....	468,476	—	19,591	24,841	—	512,908
North Carolina.....	1,259	—	599	—	—	1,858
North Dakota.....	7,311	50,929	10,863	10,981	—	80,084
Ohio.....	226,399	45	27,227	54,604	—	308,275
Oklahoma.....	30,026	33,906	6,383	10,856	—	81,171
Oregon.....	93,903	14,235	26,880	12,876	20,409	168,303
Pennsylvania.....	165,529	10	176,618	2,840	—	344,997
South Dakota.....	101,208	459,120	48,628	44,469	—	653,425
Tennessee.....	35,910	435	9,082	59	—	45,486
Texas.....	57,459	21,015	10,236	13,949	—	102,659
Utah.....	553,833	1,280	1,168	—	1,625	557,906
Virginia.....	39,357	—	37,128	1,168	—	77,653
Washington.....	858,996	123,065	75,507	39,222	3,209	1,099,999
West Virginia.....	2,125	—	2,657	—	—	4,782
Wisconsin.....	57,024	382,045	67,042	4,133	—	510,244
Miscellaneous ²	6,219	2,046	1,155	15,465	—	24,885
Parcel post.....	30,065	61,576	23,180	3,371	—	118,192
Total.....	7,601,363	4,313,869	1,730,059	1,635,903	757,700	16,038,894

¹ These figures include intermarket shipments.

² Under miscellaneous are included small daily shipments received from different States.

The smaller cities obtain most of their eggs from the producing territory immediately surrounding them, but the larger cities must draw most of their supply from more remote producing sections. The larger the city and the more extensive the suburban population, the greater becomes the problem of obtaining a supply and the greater the necessity for securing a part of it from greater distances.

Most of the surplus eggs produced in New York, New Jersey, and Pennsylvania are sent to New York City, but the quantity shipped to that market from these States in 1931 was only about 11.5 per cent of the total supply. More than 50 per cent came from the Middle West; about 20 per cent from California, Oregon, and Washington:

about 30 per cent from these three States plus Colorado, Idaho, and Utah; and a much smaller quantity came from the Southern States.

THE PROBLEM OF TRANSPORTATION

When eggs are produced by small flocks, in sections located a long distance from market, it is necessary that they be assembled and packed properly in large lots for economical handling and shipment. Thus the business of the egg buyer and shipper has become necessary.

The egg is a delicate, fragile food product. Under unfavorable conditions it deteriorates rapidly. Moreover, shipments to the large eastern markets from the Middle Western States, where the greater number of eggs are produced, must travel an average of more than 1,000 miles. This indicates the need for refrigerator cars and suggests the general scope and complexity of the transportation prob-

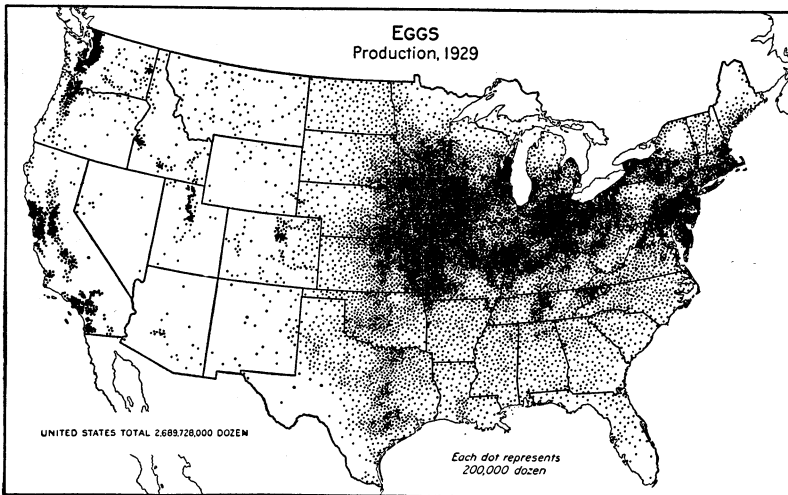


FIGURE 1.—Egg production is widely distributed, and the commercial receipts are gathered from many States

lems involved. The Interstate Commerce Commission reported that in 1930 over 53,795 cars of eggs originated on Class I railroads of the United States.

SEASONAL PRODUCTION

If eggs were produced at a uniform rate throughout the entire year, the supply would be uniform and continuous and the problem of marketing would be much simplified. But the production is highest during the spring and early summer and gradually declines during the fall, until it reaches its low point in November and December. This is well illustrated in Figure 3 by the receipts of eggs at the five markets.

THE FUNCTION OF COLD STORAGE

The uneven seasonal production results in a surplus during the spring season and a corresponding scarcity during the fall and winter. It is one of the functions of the wholesale egg trade to equalize the

supply and meet the demand at all seasons as nearly as possible. This is done by moving part of the spring eggs through the usual channels for immediate consumption while the rest are carefully candled, packed, and placed in cold storage, where they are held until fall and winter when there is a shortage of fresh eggs. Eggs specially packed for storage in new cases made of odorless whitewood, with new fillers and flats, are called "storage packed" and sell for slightly higher prices than do those packed in other ways.

In the past, approximately 12 to 15 per cent of the total annual production of eggs has been stored either as shell eggs, or as frozen eggs. With present improved poultry practice and the consequent greater winter egg production, it is doubtful if it will be necessary to store so large a percentage of the annual egg crop in the future. The work of storage begins in March, is most active during April and May, continues at a lessened rate during June and July, and ends about August 1. Withdrawal of eggs from storage is slight in

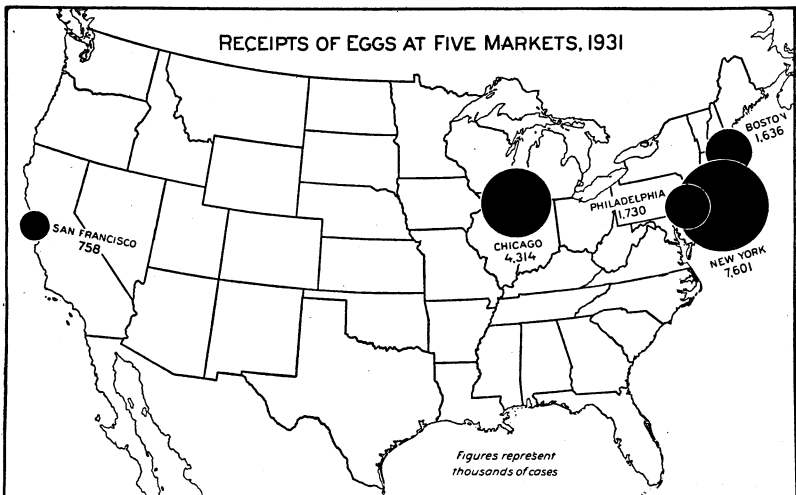


FIGURE 2.—Receipts of eggs at the principal markets give some indication of the leading centers of consumption

August, but gradually increases in September and October, is heaviest in November and December, and continues through January and February until the stocks are practically exhausted by March 1 or earlier. (Fig. 4.)

Reports on the cold-storage holdings of eggs for the United States as of the 1st of each month are released about the 12th of the following month by the United States Department of Agriculture. Reports of the holdings in 10 of the principal markets are available daily and reports of the holdings in 26 cities weekly. The holdings in the 26 cities,¹ except when very small in quantity, show a rather regular relationship to the total United States holdings and can be

¹ New York, Chicago, Philadelphia, Boston, Providence, Buffalo, Syracuse, Cuba, N. Y., Lowville, N. Y., Pittsburgh, Cleveland, Detroit, Minneapolis, St. Paul, Milwaukee, Plymouth, Wis., Marshfield, Wis., Green Bay, Wis., Denver, Kansas City, St. Louis, Omaha, Portland, Oreg., Seattle, San Francisco, and Los Angeles constitute the 26 cities. The additional cities making up the 35 are Springfield, Mass., Cincinnati, Duluth, Fort Worth, Dallas, Petaluma, Calif., Santa Rosa, Calif., San Diego, and Oakland.

used successfully to estimate the total United States holdings, as of the 1st of each month before the latter figures become available. To meet a demand for a weekly report of holdings which would include more cities and, therefore, a larger proportion of the total United States holdings, a weekly report is now issued both for the 26 cities and for 35 cities composed of the original 26 and 9 additional cities. In spite of larger holdings in the 35 cities it does not appear that they form a much better basis for estimating the total United States holdings than did the holdings of the 26 cities. (Fig. 4.)

Holding eggs in cold storage is a legitimate and needed market function which benefits both producers and consumers. Without cold storage, eggs would hardly be worth enough in the spring, in many localities, to make it worth while to gather them; in the fall the supply would be far from sufficient to meet the demand, and the price would be so high as to be prohibitive to most consumers.

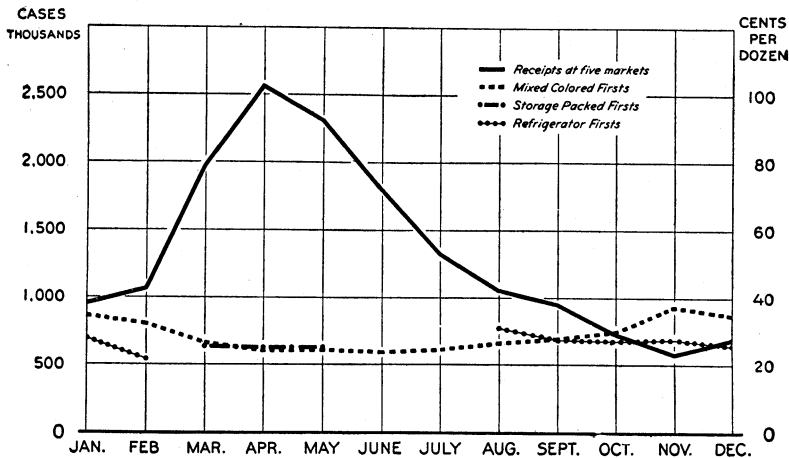


FIGURE 3.—Wholesale price of eggs at New York and receipts at five markets, average, January, 1929–December, 1931. The price of eggs rises as receipts decrease and falls as receipts increase. Storage-packed eggs bring a slightly higher price because of the better packing. The price of refrigerator eggs is normally below the price of fresh eggs

Through the storage of eggs there is a demand in the spring for the surplus, resulting in better prices to the producers; in the fall and winter a large supply of wholesome storage eggs is available at prices within the reach of consumers, yet the demand for new-laid eggs is sufficient to maintain their price at a level which makes winter egg production profitable.

MARKETING METHODS

The marketing methods employed may be relatively simple or decidedly complex. The care, handling, and promptitude associated with each method has a decided effect upon the quality of the eggs, upon the satisfaction which they afford the consumer, and upon the price paid to the producer.

Egg-marketing methods may be divided into three groups—direct, indirect, and intermediate. Direct marketing is the sale of eggs by the producer to the consumer. Indirect marketing is the sale of eggs

by the producer to various agencies which in turn sell to packers or concentrators. Under this method the eggs pass through a series of agencies and may be in trade channels for several weeks or longer before they reach the consumer. In intermediate marketing the producer sells to dealers in the consuming market, the eggs passing through the hands of one or more dealers before they reach the consumer. (Fig. 5.)

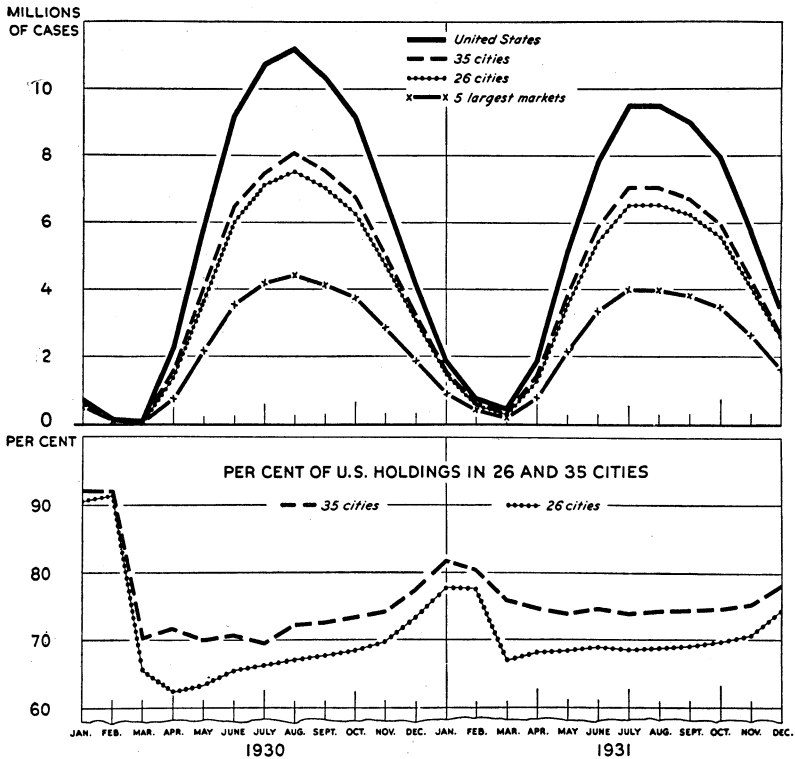


FIGURE 4.—Cold-storage holdings of eggs, January, 1930–December, 1931. Cold-storage holdings of eggs (1) in the United States, (2) in the 5 largest markets, (3) in 26 markets, and (4) in the 35 markets, with the percentage of total United States holdings in the 26 markets, and in the 35 markets, 1930 and 1931. Stocks of eggs normally begin to accumulate in storage in March, increase rapidly in April and May, increase more slowly in June and July, and reach their high point about August 1

MARKET CHANNELS

PRODUCER TO CONSUMER

As a rule, direct marketing from the producer to the consumer involves a considerable number of small sales at the best prices obtainable, and its continuance depends upon the delivery of a high-quality product. Whether the producer can afford to employ direct-marketing methods depends upon his proximity to a consuming market and upon the time and expense entailed in establishing and maintaining a trade for all or a goodly portion of his product. In delivering eggs to the consumer the producer may use the parcel post, establish an egg route, or deliver his own eggs. On the other hand, he may operate a roadside market, or depend upon sales at his own door.

PRODUCER TO RETAILER OR HOTEL

Producers frequently sell to retailers or to hotel, restaurant, and soda-fountain trade. The prices received are often nearly as good as for deliveries direct to the consumer, and this method has the advantage of requiring fewer deliveries with a larger volume in each. It is therefore less expensive than selling direct to consumers. Deliveries to this trade are made by automobile truck, parcel post, or express shipments.

PRODUCER TO WHOLESALE DEALER

A large number of producers sell their eggs to jobbers or wholesale dealers, shipping one or more cases into the market by express. Such a method of sale requires considerably less effort from the producer, as he does not have to establish and maintain contacts with

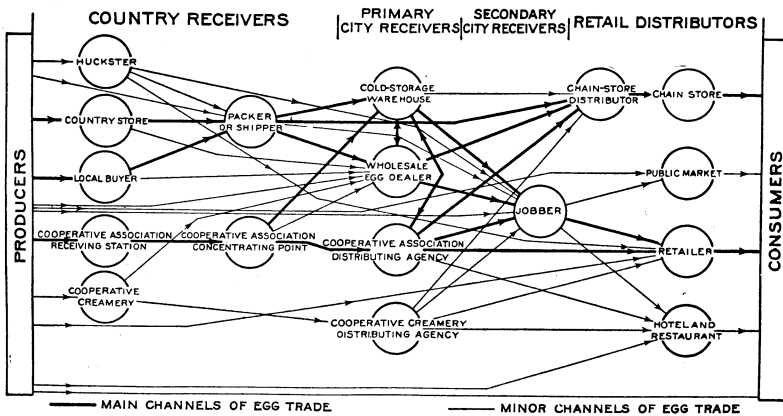


FIGURE 5.—Eggs reach their final market through numerous channels

the consuming trade. On the other hand the return is somewhat less. When contact with a reliable dealer has been established this method is often very satisfactory.

THE COUNTRY STOREKEEPER AND THE EGG PACKER

Many of the commercial market eggs produced on general farms in the Middle West are marketed through the country car-lot packer and shipper. This process involves the passage of the eggs through a relatively large number of hands. The farmer may take his surplus eggs to town when it is convenient and sell them to a local merchant for trade, or to a local egg buyer for cash. In some sections hucksters with trucks go through the country and purchase eggs at the farmer's door.

The custom prevalent among hucksters and local merchants in many sections of the Middle West, of buying eggs on the "case count" basis, is most damaging to quality. When eggs are bought on this basis, payment is made solely on the number of dozens of eggs delivered, without regard to their quality or the percentage that are good or bad. Such a system offers no incentive to the careful farmer to produce good eggs, for he receives no more than does the

man who produces poor eggs. In the last few years there has been a decided tendency to substitute for the "case count" basis of buying, a "loss-off" basis, under which no payment is made for eggs that are unwholesome and unfit for food, and a difference, based on quality, may be made in the price paid for the good eggs. Some States have laws which regulate egg buying and require that a "loss-off" basis be used.

The country merchant or storekeeper and the local egg buyer ship the eggs to car-lot packers or shippers or to less-than-car-lot receivers in the market. A considerable time often elapses before these eggs are shipped, and the conditions under which they are kept are often so unfavorable that a distinct deterioration in quality occurs. Some egg packers pay premiums to producers who bring the eggs direct to the central packing plant at regular and frequent intervals, the purpose being to obtain the eggs while they are still new laid. When eggs are received by a car-lot packer or shipper who uses modern equipment they are immediately placed in refrigerated rooms at a temperature between 35° and 40° F. and held there until they are thoroughly cooled. Some of the smaller shippers are not so well equipped, and the eggs may not be handled so well, but they are candled, graded, repacked, and shipped by refrigerated fast freight or express, either in car lots or in less-than-car lots, to a large market where they go into consumptive channels immediately or are placed in storage for future sale. In the large markets the eggs are distributed by the receiver to retailers or to jobbers who, in turn, sell them to retailers.

When eggs are marketed through this channel, considerable time may elapse between the time the egg is laid and the time it reaches the consumer. Usually it takes three weeks, and in some cases considerably longer, especially when the eggs are held in cold storage for future sale.

EXCHANGE TRADING IN EGGS

In most large egg markets (in practically all of the larger cities), exchange organizations composed of wholesale dealers have formulated rules that govern trading in eggs and other commodities by their members. These exchanges maintain quarters where wholesale trading may be done on each business day. In some cases, the prices at which sales are made, and at which sellers offer goods and buyers bid for them, constitute the basis on which market quotations are established. In other cases, the sales, bids, and offers are taken into consideration, along with "street" sales or sales made outside the exchange, in arriving at market quotations.

COOPERATIVE MARKETING

Egg producers in certain sections have formed cooperative marketing agencies, either because of the unsatisfactory prices which they have received, or because of an overstocked local market and the necessity of selling their surplus in distant markets. The smallest local cooperative marketing enterprise is the egg circle. In forming one of these circles several producers pool their eggs for shipment to a common market, usually in small lots by express. Another plan of cooperative egg marketing uses the local cooperative creamery to

obtain an outlet. As the farmers are already marketing their milk or cream through the creamery, it is comparatively easy for them to deliver their eggs at the same place and at the same time.

In certain sections, however, special marketing associations handle the produce of a large number of producers. The eggs are generally collected at local receiving stations, from which they are taken to the packing plant, where they are carefully graded and shipped to market in car lots under refrigeration. The cooperative poultry and egg marketing associations of the Pacific coast are excellent examples of the successful operation of such a plan.

EGG STRUCTURE AND COMPOSITION

To understand the conditions or factors that may affect the quality of eggs their structure and composition should be understood. (Fig. 6.) The yolk is suspended in the white at approximately the center of the egg and is surrounded by the vitelline membrane. On the surface of the yolk, and usually on its upper side, is the germ or germ-

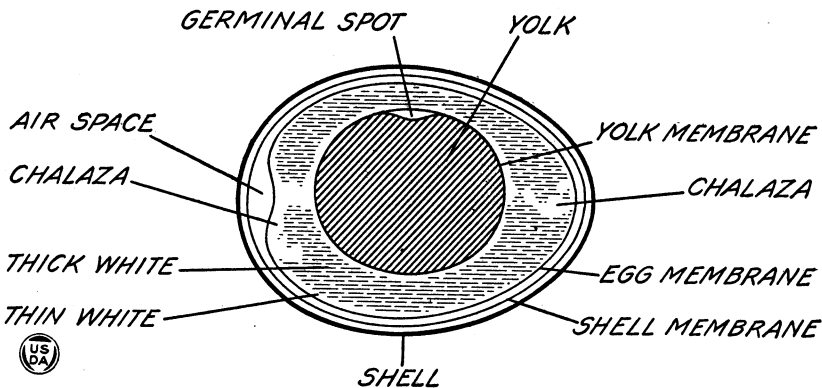


FIGURE 6.—The parts of an egg

inal spot. In some cases there may be more than one. In an infertile egg this germ spot is small and irregular in shape; in a fresh fertile egg it is round and larger. This germ, in a fertile egg, develops into the embryo. The size of the germ spot therefore varies, depending upon the degree to which this development has taken place.

The white consists of albuminous material which fills the space between the yolk and shell. It varies in density, being thickest in the portion near the yolk and thinnest in the portion next to the shell membrane. The white is clear and transparent except for two cloudy-white thickened portions, resembling twisted cords, which adhere to the yolk at the points nearest the ends of the egg. These cords, called chalazae, allow the yolk to rotate freely as the egg is turned but serve to retard the rise or settling of the yolk toward the shell when the egg is left in one position for any length of time.

The shell is composed largely of lime. As it is porous in structure, it allows the evaporation of water from the egg contents, the penetration of odors and flavors from without, and, under unfavorable environment, the entrance of bacteria. Immediately lining the shell are two shell membranes which serve as a secondary protection to the

contents. When the egg is first laid and is still warm, the contents entirely fill the shell. As the egg cools and the contents shrink a small air cell is found between the two shell membranes, usually at the large end, where these membranes separate most easily. Evaporation of the contents takes place with the aging of the egg, and the air cell gradually grows larger. (Fig. 6.)

In the hen egg, the shell comprises about 11 per cent, the white about 57 per cent, and the yolk about 32 per cent of the entire weight. The composition of the egg, of the egg white, and of the egg yolk is given in Table 2. The eggs of other classes of poultry differ somewhat from hen eggs in their composition, but this difference is small.

TABLE 2.—*Composition of the hen egg*¹

	Refuse (mainly shell)	Water	Protein	Fat	Ash	Total ²
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Whole egg.....	11.2	65.5	11.9	9.3	0.9	98.8
Whole egg (edible portion).....		73.7	13.4	10.5	1.0	98.6
Egg white.....		86.2	12.3	.2	.6	99.3
Egg yolk.....		49.5	15.7	33.3	1.1	99.6

¹ LANGWORTHY, C. F., EGGS AND THEIR VALUE AS FOOD. U. S. Dept. Agr. Bu. 471, 29 p., illus., 1927.

² The difference between these total percentages and 100 is made up of undetermined substances.

FACTORS AFFECTING QUALITY

If eggs are to reach the consumer in good edible condition, and if the enormous waste through deterioration and spoilage is to be diminished, they must receive intelligent care and handling from the time they are laid until they are eaten, and the whole marketing process must be expedited as much as possible.

Quality is determined by five primary factors—condition of the shell, condition of the air cell, condition of the yolk, condition of the white, and condition of the germ. As all these parts except the shell are inside the egg, their condition must be determined by candling.

SHELL

In eggs of first quality the shell must be strong, sound (free from any cracks or checks), regular (free from abnormalities of structure or mottling which may cause weakness), and must be clean. Strength and soundness are necessary to insure good shipping and good keeping quality. Cleanliness affects both price and keeping quality, because dirty eggs spoil more rapidly than do clean eggs.

AIR CELL

The air cell develops at the large end of the egg by the separation of the two shell membranes and the filling of this space with air. In eggs of best quality the air cell must be small, not over one-eighth inch in depth, measured from the end of the shell to the plane passing through the egg at the lower edge of the air cell where it touches the shell. The air cell should occupy a fixed position and not be movable. Large air cells are an indication of staleness or age; tremulous air cells are associated with a loosening of the two mem-

branes, which may develop with age or which may be caused by jarring; and freely movable air cells indicate broken membranes.

YOLK

The yoke of a fresh egg should be only dimly visible as a shadow when the egg is turned before the candle. It should have limited freedom of motion. Rapid and freer motion and greater visibility of the yolk indicate lower quality. Detachment of the chalazae may permit the yolk to rise and stick to the shell, particularly when the eggs are packed with their small ends up. When broken out in a dish the yolk of a fresh egg is well rounded or "stands up" well; the yolk of a stale egg is flatter and more spread out. The color of the yolk may range all the way from a pale to a deep yellow. The color depends largely upon the amount of green feed which the hens have received, and therefore varies to a considerable extent with the season.

The color of the yolk may affect the price of the egg to a limited extent, especially where some special demand is to be met. Many consumers prefer a fairly deep-colored yolk, but there is a special demand in the New York City market and elsewhere for eggs with pale yolks.

WHITE

The white of an egg of extra quality should be firm and clear. Weak or thin white indicates staleness, and bloody white, or the presence of any foreign substance, such as a blood clot or meat spot, reduces or destroys the market value.

GERM SPOT

In a fresh egg the germ should show no visible development before the candle, and even when the egg is broken out the germ spot should show little or no development. In fertile eggs subjected to a temperature of 72° F. or over, the development of the germ will proceed and the spot may be one-third inch in diameter or even larger before any blood is shown. As soon as blood shows the egg is no longer edible. The development of the germ spot before this point is reached affects the quality adversely in proportion to such development.

SECONDARY FACTORS

In addition to the primary quality factors mentioned, there are three secondary factors which affect quality—color of shell, size, and weight. These factors can be determined without candling; they do not affect the wholesomeness of the egg, but may affect its market price. Whether the shade of color will affect the price depends upon the market to which the eggs are consigned.

Fancy eggs command a premium in the New York market if they are pure white, whereas fancy browns command a premium on the Boston market. On any market it is important that a lot of eggs be uniform in color; that is, all brown or all white, rather than brown and white mixed. A mixture of colors adversely affects the appearance of the eggs as a lot and usually affects the price.

Uniformity in size also affects market price because a lot of uniform size presents a more pleasing appearance. Mixing small eggs with normal-size eggs is sure to detract from the market value. The small eggs should be sorted out and used at home or marketed separately. Unusually large eggs marketed in standard packages are likely to break. If broken they are not only a loss in themselves but they smear and damage the other eggs.

Weight affects prices. Official market grades usually specify minimum net weights per case. Since the food value of a dozen eggs is directly proportionate to their weight, it is obvious that weight should be important in determining price. (Fig. 7.)

Besides meeting the standards already enumerated, eggs should be free from any abnormal flavor or odor. The most common abnormal flavors are sourness and mustiness. Foreign flavors may be absorbed from any strong-smelling material kept near the eggs.

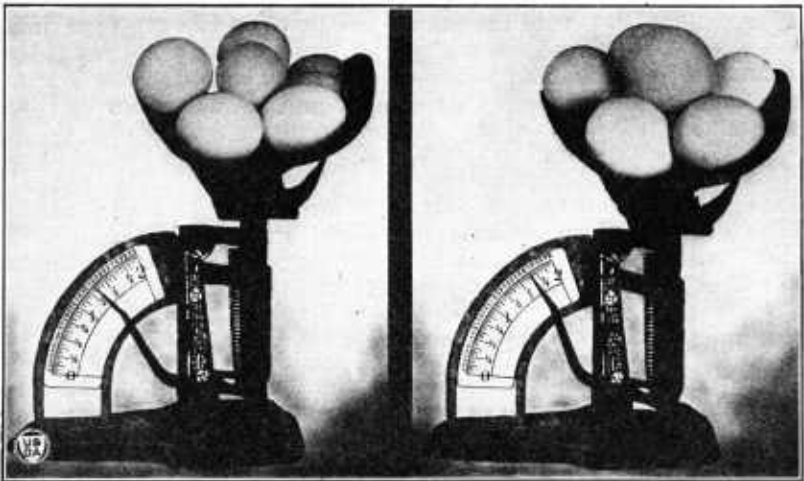


FIGURE 7.—The food value of eggs varies in direct proportion to their weight. The dozen eggs on the left weigh $21\frac{1}{2}$ ounces, the dozen on the right $26\frac{1}{4}$ ounces. Their quality is the same. Should they be sold at the same price?

It is impossible to detect these defects before the eggs are used, but care should be taken to prevent them by keeping the eggs under good conditions. Storage flavor is a common characteristic of under-grade eggs that have been held in storage and of eggs that have been held under improper storage conditions.

FARM CARE ESSENTIAL TO GOOD QUALITY

Practically all eggs are of good quality when first laid. But if they are to retain their quality and reach the market in good condition they must be properly cared for and handled by the producers. No marketing process can improve an egg of poor quality. All that can be done is to preserve the original quality. Good care on the farm is therefore a prerequisite to the marketing of good eggs.

First of all good poultry stock of a standard variety is necessary in order to produce eggs of uniform size and color. The flock must be well housed, fed, and cared for in order to increase productivity.

As soon as the hatching season is over, all male birds should be disposed of, or separated from the hens, so that only infertile eggs of superior keeping quality will be produced. Nests, clean and sufficient in number, must be provided in order that the largest possible percentage of the eggs can be kept clean. Dirty eggs should never be washed unless they are for immediate consumption. Washing reduces the keeping quality and results in losses, especially if the eggs are placed in storage.

Eggs must be gathered frequently, at least once a day. During very hot or very cold weather it is preferable to gather them twice a day to prevent them from being heated or frozen. They should be kept in a cool, moderately dry place to maintain their quality and to prevent mold development. All very small, very large, or very dirty eggs should be used at home or sold to local consumers. They should not be shipped to market.

CANDLING EGGS

Eggs are candled to determine their quality as shown by the condition of the air cell, yolk, white, and germ. Candling consists of holding the egg before a strong light, usually artificial, in such a way that the rays of light penetrate the egg to a considerable extent, thus making it possible to observe the condition of the contents. Most producers do not candle eggs, although buyers and dealers find it advantageous to do so. Where a high-class retail trade is being catered to, candling by producers is necessary, for sometimes absolutely fresh, new-laid eggs are unsuitable for food and if delivered will hurt the reputation of the producer. Such eggs are those with bloody whites, blood spots, and meat spots.

Candling should be practiced more generally by producers. If done daily, it is a short process on the average farm and will eliminate any eggs which are badly deteriorated.

Homemade egg cinders may be made easily and cheaply, using any light sufficiently strong. An electric light is best, but a good kerosene lamp, a gas flame, or sunlight can be used. One of the simplest and most satisfactory homemade devices consists of a length of stovepipe with an electric light or a kerosene lamp inside. A round hole $1\frac{1}{4}$ inches in diameter should be cut in the stovepipe directly on a level with the light. (Fig. 8.) A tin can having a removable top and large enough to take an incandescent lamp, with a $1\frac{1}{4}$ -inch hole in the side of the can opposite the light filament, is another satisfactory homemade device where electric light is available. (Fig. 9.)

In candling, the eggs are held in a slanting position with the large end against the hole through which the light passes. The egg is grasped by the small end, and while held between the thumb and the tips of the first two fingers, it is given one or two quick turns on its long axis. (Fig. 10.) This moves the contents of the egg and throws the yolk nearer the shell, allowing its condition to be more carefully observed.

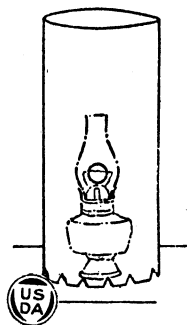
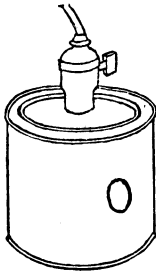


FIGURE 8.—A length of stovepipe and a lamp or electric light are easily converted into an egg candle

The egg must be turned so that all sides are exposed to the candler's view. Otherwise the only evidence of an undesirable condition might occur in that portion not observed by the candler. In that case the egg would be misgraded. For the same reason, as little of the egg as possible should be obscured by the thumb and fingers holding it. The dark color of the shells of brown eggs makes them more difficult to candle than are white eggs. It is not necessary for producers to have extensive and detailed knowledge of candling. They should be able to distinguish a fresh egg from a stale egg and to detect undesirable qualities. In a fresh egg the air space is small, measuring not over one-eighth inch in depth. The yolk is dimly visible, possesses limited freedom of motion, and shows no visible germ spot. The white is firm and clear and absolutely free of floating solid particles like meat spots or blood clots. (Fig. 11, A.)



FIGURE 9.—An electric light and a tin can with removable top make a cheap and easily constructed egg candle



In a stale egg the air space is larger, and it may have an irregular movable lower outline. The yolk is plainly visible and moves freely. The white is thin and clear. (Fig. 11, C.)

In a heated egg the germ spot is developed, and the air space is usually enlarged although it may still be comparatively small. The yolk is usually above the middle of the egg, is plainly visible, has a distinct reddish glow, moves freely, and has a visible germinal spot. (Fig. 11, B.) If a blood ring or blood veins are visible the egg is inedible. The white is thin and clear. Stale and heated eggs are of very poor quality.

Fresh eggs may have bloody whites. Before the candle they can be distinguished by the red color of the white and often by the irregularly shaped bodies or blood clots floating in the white or on the surface of the yolk.

Foreign material shows as dark-colored particles in the white, often called "meat" spots. Blood rings or reins indicate that the

embryo has developed to the point where blood appears. If the embryo or germ has died the blood will have collected in a ring or circle known as a blood ring. (Fig. 12, A.) Such eggs are common during hot weather if fresh fertile eggs are held at ordinary room

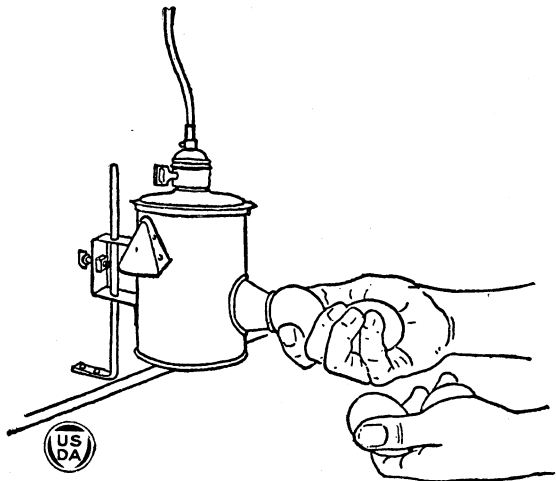


FIGURE 10.—There is a best way to hold and handle eggs while candling

temperatures for any considerable time. Eggs showing blood rings are inedible.

Various other classes of eggs are unsuitable for food, such as stuck yolks, moldy eggs, and rots. (Fig. 12, B and C.) Most of

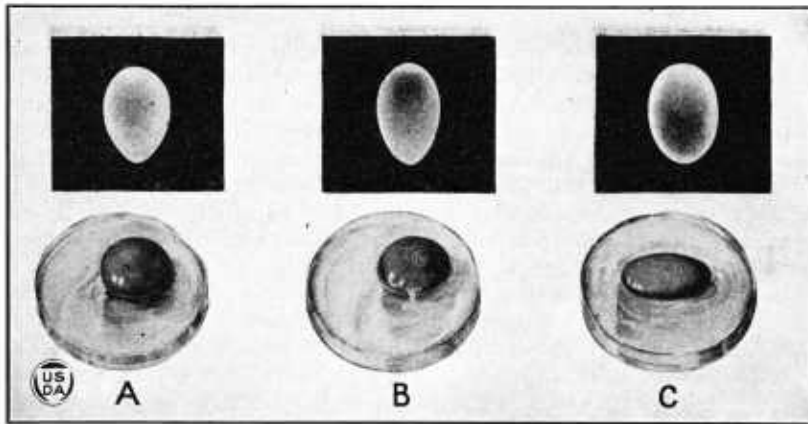


FIGURE 11.—The common classes of edible eggs show differences, both before the candle and when broken out, which serve to distinguish them readily. A, fresh egg, with strong, well-rounded yolk; B, heated egg, showing germ development; C, stale egg, having weak, flattened yolk

these are easily distinguished from fresh eggs and are of interest to the producer only because they should not be sent to market. Eggs sometimes have minute cracks or blind checks that are invisible to the naked eye but apparent before the candle. These should not be

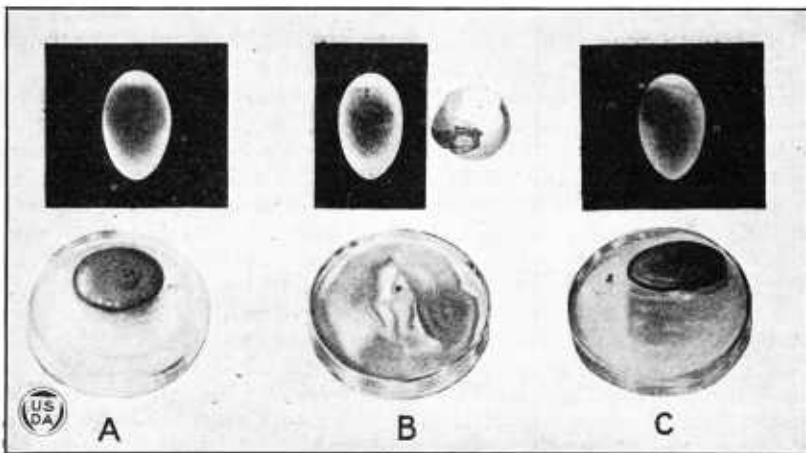


FIGURE 12.—These are common types of inedible eggs distinguishable before the candle. A, blood ring; B, moldy cracked egg; C, egg with yolk beginning to adhere to shell

sent to market but should be used at home, as they will not keep well and are easily broken.

All handlers of eggs, from the producers to the city jobbers, should satisfy themselves of the quality of the eggs which they buy or offer

for sale. This can be accomplished only by candling. In commercial packing plants the candling should be done by expert candlers in rooms maintained at a temperature not over 65° F. The "candle" used should consist of an electric-light bulb inclosed in a metal shield which may have one or two holes or spouts against which the eggs are held.

The expert operator stands before the light which is fastened at a convenient height, usually 38 to 44 inches from the floor. He handles the eggs very rapidly. At his side, or directly in front, on a shelf 22 to 26 inches high, is placed the case of eggs to be candled. After removing the top padding or flat, the candler lifts the first filler out of the case, leaving the eggs lying loose on the next flat. He picks up the eggs, two in each hand. After candling one egg in each hand, by a quick manipulation of the thumb and fingers he reverses the position of the eggs and candles the other egg. (Fig. 10.) As the eggs are candled they are graded and each is placed in the proper case for its grade. In repacking the eggs new fillers and flats are used. The average candler, working at a steady pace but without undue effort, candles 25 cases of eggs or more in a 10-hour working day, an average rate of 15 eggs per minute. Storage eggs and others of uncertain quality are usually recandled in the final distributing and consuming markets before they are offered to the retail trade.

In learning to candle eggs the eye must be trained to look for those points that have been enumerated, and to note them quickly. Frequent checking of the candler's judgment by breaking out eggs, particularly those about which there is doubt, will prove very instructive and will aid the beginner to acquire confidence and skill.

GRADING EGGS

Grading of eggs is merely a process of sorting them according to quality and packing each quality in separate containers.

Grading eggs is simple and should never be neglected by producers. It consists of discarding all eggs unsuitable for food, and sorting out those which, by reason of their small or large size, or dirty or cracked condition, are unsuitable for market but which, if wholesome, should be retained for home consumption or for local retail sale. If every farmer practiced this simple method of grading, much of the trouble and loss in handling eggs commercially would be eliminated, and the general quality of the market egg would be improved.

In the regular commercial channels, eggs are graded at the point where they are packed for shipment to market, usually at the packing plant. In many instances this is the first time they are graded. Candling, grading, and packing are done in a single operation. As the condition and quality of the egg are ascertained by candling and its grade is determined it is packed in the case assigned to that grade.

Grading on a commercial scale is usually done before an electric light, but occasionally, when eggs are graded for a particularly fancy trade, they are taken into the daylight for grading, after they have been candled, in order to secure the highest possible degree of uniformity in color and cleanliness.

When disputes arise in the large markets about the grade of a lot of eggs, official inspectors make inspection and certify the grade. Certain standard fees are charged for this service.

COMMERCIAL GRADES

When eggs are received at the various markets their quality may differ widely as a result of the conditions under which they have been produced and handled. To provide a practical basis for reporting prices and for trading, it is necessary to establish certain standards based on commercial quality, and to grade according to these standards. At present, each market has its own grades, and the result is a decided lack of uniformity throughout the country. A grade name in one market may not signify the same quality in another market. Such a lack of uniformity in grades causes confusion and uncertainty, especially in trading between widely separated markets and in comparing market quotations of different markets.

Results of using uniform grades in the marketing of many other agricultural products seem to indicate that the use of such grades in the egg trade would tend to promote a more perfect reflection of true values in all markets, would stimulate a freer trade between distant markets, and would help to create confidence and to eliminate confusion in marketing.

The United States Department of Agriculture has formulated standards of quality applicable to individual eggs. With the standards of quality as a basis it has also formulated three sets of egg grades, known as United States buying grades, United States wholesale grades, and United States retail grades. The buying grades are intended for use at country points at which eggs are purchased from producers. The wholesale grades are intended for use in wholesale channels of trade, and the retail grades for use in connection with eggs ready for sale to consumers. The United States standards and grades for eggs are intended for uniform application throughout the country and when so used will provide a greatly needed common language of quality for eggs, and should prove to be an important factor in improving marketing conditions.²

In most markets, eggs are divided into two general classes based upon freshness: Fresh, or fresh gathered, and refrigerator, or storage. Fresh eggs are those which are not required to be sold under some other class designation, such as refrigerator. Refrigerator eggs are those which have been in cold storage under conditions which prohibit their sale as fresh eggs or require them to be sold as cold-storage or refrigerator eggs.

In most markets a separate class is made of processed or shell-treated eggs, that is, eggs which have been oil treated, the better to preserve their quality. (P. 28.) In some markets a separate class is also made for short-held or held-fresh eggs, which have not been in cold storage a sufficient length of time to require their sale as refrigerator eggs but which may not have reached the market promptly or may have been held under moderate refrigeration for a short time and therefore do not conform to the requirements for either fresh gathered eggs or storage eggs.

In addition to the division into classes, a division is also made on the basis of method of packing. "Storage-packed" eggs are those packed especially for storage, in new cases made of odorless white-

² For detailed information concerning the United States standards and grades for eggs, write the U. S. Department of Agriculture.

wood with new fillers and flats, weighing $3\frac{1}{2}$ pounds or more to the set. Other packs are recognized, including eggs "in shipping cases," which may allow the use of good secondhand cases but which should always require new fillers and flats of medium grade or better.

The various classes of eggs are further divided into grades based upon quality. Subgrades such as Mediums and Pullets, based upon the net weight of the eggs per case, are often recognized.

Duck, goose, and guinea eggs are received on some markets in considerable quantities. Duck eggs are usually quoted separately with differences in their quality reflected by different prices. Sometimes duck eggs are quoted according to the point of origin, as "duck eggs, southern" and "duck eggs, western."

Goose eggs are received in much more limited quantities, and are quoted in a single grade. The price depends upon their condition and the supply.

Guinea eggs are not often quoted as such. They are more likely to be received mixed with hen eggs, particularly in the South, and are often marketed in one of the lower grades of hen eggs.

As an example of commercial egg grades in common use three wholesale grades of the New York Mercantile Exchange are defined below:

Mixed colored standards, fresh.—Shall be storage packed. The average net weight shall be at least 45 pounds per case; no single case weighing less than 44 pounds. The entire lot shall be from one shipper, and from one shipping point, and of one mark; and shall have been received at the same time; and there shall not have been any substitution or addition subsequent to the receipt thereof. There shall be no checks except in the loss. The eggs shall be of uniform size, except there may be a maximum of 12 small eggs to the case, of the average weight of not less than 20 ounces per dozen, and a maximum of 24 (including such 12) small eggs to the case, of the average weight of not less than $21\frac{1}{2}$ ounces per dozen. The average loss from bad eggs shall not exceed 6 eggs per case. The average total loss (including bad eggs) shall not exceed 18 eggs per case. At least 65 per cent of the eggs in each case shall be clean, strong bodied, sweet, free from visible germ development, and with maximum air space of one-fourth inch. The balance may show slight germ development, and have a maximum air space of three-eighths inch, but shall be clean, strong bodied, and sweet.

Rehandled receipts.—The minimum requirements for rehandled receipts shall be the same as for standards, with the following exceptions: The fresh eggs need not be storage packed. The eggs shall be from one shipper, but need not be from one shipping point or of one mark, provided the inspection order so states, with the number of cases from each point and of each mark. The average net weight shall be at least 43 pounds per case; no single case weighing less than 42 pounds. The eggs shall be of uniform size, except there may be a maximum of 18 small eggs to the case, of the average weight of not less than 20 ounces per dozen and a maximum of 30 (including such 18) small eggs to the case, of the average weight of not less than $21\frac{1}{2}$ ounces per dozen. The average loss including bad eggs shall not exceed 24 eggs per case. At least 50 per cent of the eggs in each case shall be clean, strong bodied, sweet, free from visible germ development, and maximum air space of one-fourth inch.

Pacific coast white specials.—The minimum requirements for Pacific coast white specials shall be the same as for standards, with the following exceptions: The average total loss (including bad eggs) shall not exceed 12 eggs per case. At least 85 per cent of the eggs in each case shall be clean, strong bodied, sweet, free from visible germ development, and maximum air space of one-fourth inch. Ninety per cent of the eggs shall be chalk white and the balance may be slightly cream tinted.

The New York Mercantile Exchange defines loss as follows:

Eggs which are bad (rotten), leaking (shell and membrane broken), spotted, broken yolked, frozen (split), hatched (blood veined), or sour, shall be deemed

full loss. Eggs which are very small (below pullet weight), very dirty, checked, badly heated, badly shrunken, salted or chilled, shall be deemed one-third loss; except that very dirty eggs upon inspection of dirties, and checked eggs upon inspection of checks, shall not be deemed any part of loss.

EGG PACKAGES

CARTONS

The smallest unit package used for eggs is the pasteboard carton, with a capacity of 1 dozen eggs, used very generally by retail trade. Cartons are made in two styles, one known as the "3 by 4," holding three rows of four eggs each, and the other as the "2 by 6," holding two rows of six eggs each. Those of the latter style are much more commonly used and will pack in ordinary 30-dozen egg cases. The carton is equipped with a filler similar to that used in the regulation egg case or with separate compartments for each egg. Cartons holding one-half dozen eggs are also used to some extent.

Cartons are not used by producers unless they are selling direct to the consumer. As a rule, it is not wise to ship eggs packed in cartons, for if an egg is broken the entire package is spoiled and has to be repacked.

Improvement in cartons is making the shipment of eggs so packed much safer than formerly and an increasing number of eggs are being shipped packed in cartons. Sometimes, for additional safety, 24 instead of 30 cartons are packed to a case, a pad or cushion flat being used between each 2 layers of cartons.

EGG CASES

The producer who ships eggs generally uses the standard 30-dozen case used by packers. Producers often use secondhand cases, but dealers or packers should always use new ones. The 30-dozen case is manufactured by firms that specialize in this business. They are shipped knocked down and are put together in the packing plants where they are used.

The standard 30-dozen case has the following dimensions: Outside, 25 $\frac{7}{8}$ inches long, 12 $\frac{1}{8}$ inches wide, and 12 $\frac{7}{8}$ inches deep; inside, 24 inches long, 11 $\frac{3}{4}$ inches wide, and 12 $\frac{1}{2}$ inches deep. It is constructed of hardwood with a partition in the center extending from side to side and dividing the case into two equal square compartments with a capacity of 15 dozen eggs each. The cases are made as light as possible while still having the requisite strength. The sides, top, and bottom must be not less than three-sixteenths inch in thickness and of not more than two pieces each. Center partition and ends must be not less than seven-sixteenths inch in thickness and of not more than two pieces each. It is important that the center partition be in the true center of the case so that the two compartments will be of equal and proper size and the eggs and packing will have neither too little nor too much room.

In nailing the cases together 3-penny cement-coated large-headed nails are used as follows: For a flush-cleat case, 18 on the side (6 in each end and 6 in the center), 21 on the bottom (7 in each end and 7 in the center), 8 on the top (4 in each end and none in the center). (Fig. 13.) Each case must be equipped with fillers and flats; pads also may be used. Shipping cases of various other styles and differ-

ent capacities are manufactured, but they are used only to a limited extent.

FILLERS AND FLATS

The ordinary filler is $2\frac{1}{4}$ inches deep, is made of strawboard or pulpboard and contains 36 square cells arranged in a square with 6 on a side. Five fillers, each holding 3 dozen eggs, are used in each side of the case, or 10 fillers in all. Fillers of this style are commonly called honeycomb fillers.

When duck eggs are shipped in regulation 30-dozen cases a special filler is used. These are exactly like the standard filler in construction, except that the cells are larger and there are only 25 cells to a filler instead of 36. Fillers slightly deeper than standard are also manufactured and are used to a limited extent in shipping extra large or extra long eggs.

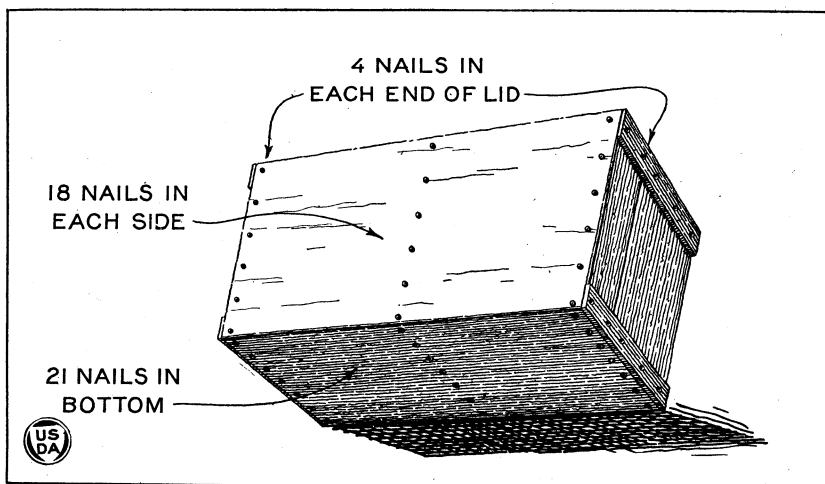


FIGURE 13.—A properly constructed egg case must be well nailed

Solid spruce-pulp fillers are in considerable favor, especially for packing eggs to be placed in cold storage, because, being odorless, they help to prevent the development of the characteristic flavor of cold-storage eggs.

The strawboard or pulpboard used in fillers and flats should be of good weight, hard-calendared in finish, and perfectly dry. Fillers weakened from use, and though they may appear to be in good condition, should not be used the second time. Flats are merely square pieces of strawboard, pulpboard, or other cushioning material, the size of the egg-case compartment, and are used between the fillers. From 6 to 16 flats are required to the case, depending upon the method of packing.

Two grades of fillers and flats are in common use. They have the following specified weights per set: $3\frac{1}{2}$ pound, $3\frac{1}{2}$ pounds per set; and No. 1, $3\frac{3}{4}$ to 4 pounds per set. Lighter fillers are manufactured to some extent and were formerly commonly used, but because they do not give as good results, their manufacture and use have been largely discontinued.

Improved methods of packing to reduce breakage brought excelsior pads into extensive use. These pads are about one-third inch thick and are made of excelsior wrapped with paper. They are the size of the egg-case compartment and, for best results, six of them are used to the case. Cup flats and various types of corrugated or cushion flats have also been devised and are successfully and extensively used. In fact they have replaced the excelsior pads to a considerable extent.

PARCEL-POST PACKAGES

Parcel-post packages must be substantial in order to protect the eggs properly; at the same time they must be as light as possible to reduce postage costs. Special parcel-post packages are made in various sizes with capacities ranging from one dozen to several dozen eggs. If the packages are not likely to be returned to the shipper, the cheaper styles made of corrugated pasteboard are most commonly used. If the packages are to be returned, more substantial types, often made of metal, are common. (Fig. 14.) The ordinary 30-dozen case, when in good condition and properly packed, is also receivable by the postal authorities for the parcel-post shipment of eggs and is used to a considerable extent.

PACKING EGGS

The purpose of packing eggs is to furnish a convenient means of handling them, and to prevent breakage during shipment. Too often farmers or egg producers pack their eggs carelessly. The postal requirements for mailing market eggs are as follows:

Eggs shall be accepted for mailing when packed in crates, boxes, baskets, or other suitable containers so constructed as properly to protect the contents. Such packages must be transported outside of mail bags. All parcels containing eggs shall be plainly marked "Eggs." When necessary, they should be marked "This side up."

When the eggs are mailed in special parcel-post packages they must be carefully packed by wrapping each egg in paper, or by other means, so that they will not shake or shift around in the package. Failure to do this is almost sure to result in breakage.

If secondhand 30-dozen cases are used, either for parcel-post or express shipment, they must be gone over thoroughly to see that they are in good condition and properly nailed. Old fillers and flats, even though apparently in good condition, should never be used as they will not protect the eggs properly. The express classification also specifies that secondhand cases must be strapped with wire or flat metal bands which must extend over the sides and bottom at each end; but not over the top.

To wire a secondhand case properly, first drive a nail in the side of the end board near the top, leaving enough of the nail exposed to make it possible to wrap the wire around it. Wind the wire around the nail and then carry it down the side, winding it around another nail near the center and around a third near the bottom. Continue it across the bottom and up the other side, winding it around three nails on each surface. After winding the wire around the nails drive them home, thus securely fastening the wire. The wire should never be carried over the top of the case.

There are several generally used methods of packing eggs in the cases. An essential characteristic of a good pack is that it be tight, holding the fillers securely in place and preventing them from shift-

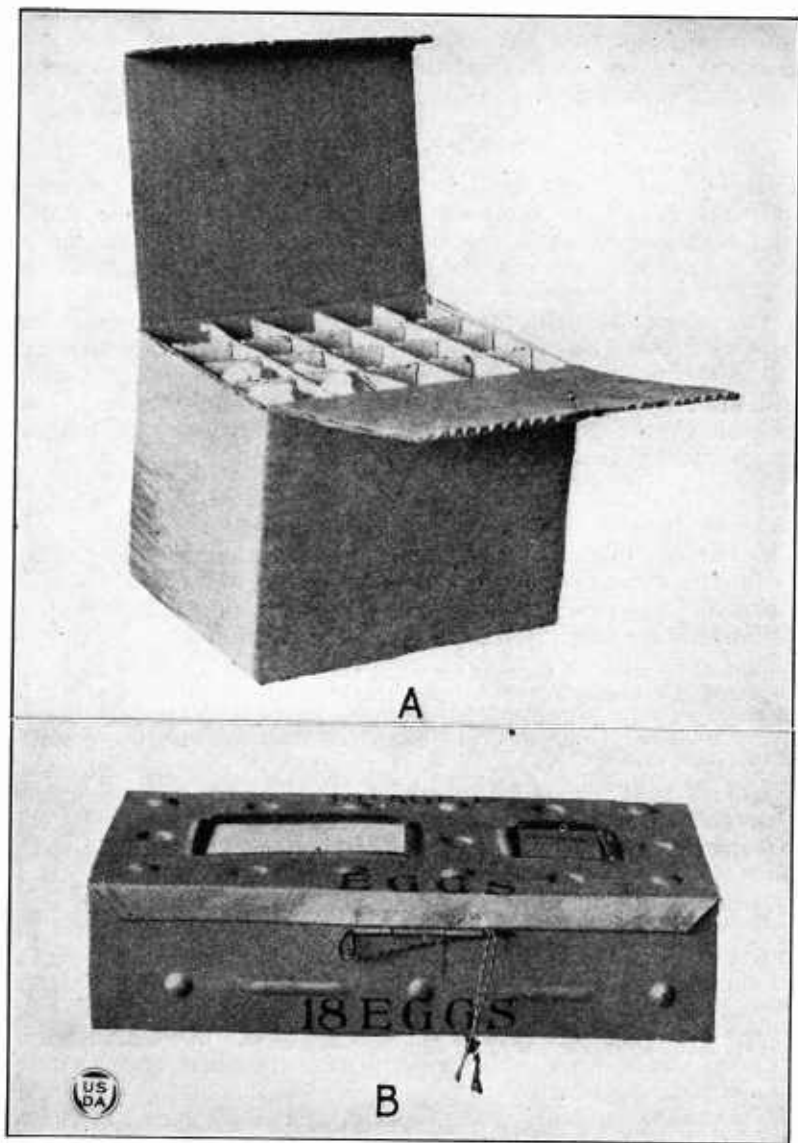


FIGURE 14.—Shipment of eggs by parcel post requires strong, light containers. A, corrugated pasteboard container; B, metal container

ing over the flats. Where excelsior pads are used, either four or six may be placed in each case. In the 4-pad pack a pad is placed in the bottom of each side of the case and one on top of the top filler. In the 6-pad pack pads are used exactly as in the 4-pad pack and in

addition a pad is placed under the top filler. Wherever pads are used, the flats should be omitted. The 6-pad pack is generally considered superior to the 4-pad pack in preventing breakage. (Fig. 15.)

New types of flats known as cup flats, corrugated flats, or cushion flats, which have been devised and are in rather general use, are giving excellent results in preventing egg breakage. Two of these flats placed back to back with cups or cushions facing out are used in the bottom of each side of the case and either one or two flats are used on top as padding. Ordinarily no excelsior pads are used with this pack although the two methods of packing may be combined. The fillers fit down between the cups or cushions and are prevented by them from sliding or shifting over the flats. (Fig 16.)

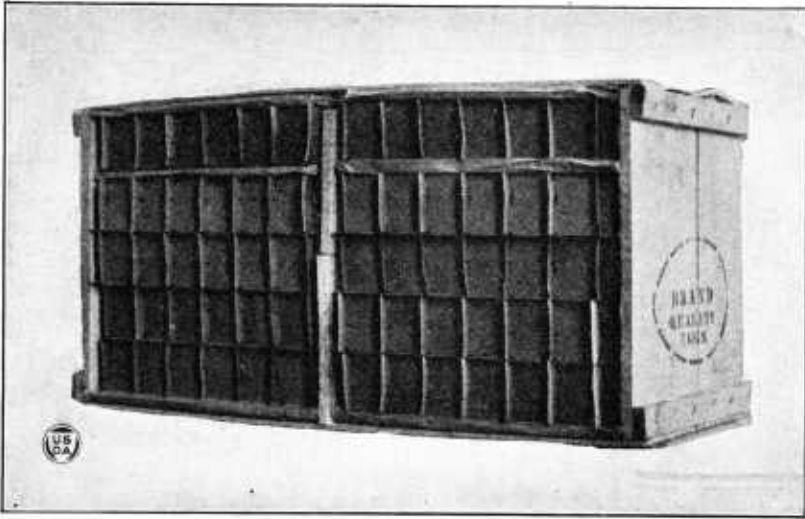


FIGURE 15.—An egg case packed with standard fillers and flats and with three excelsior pads to a side is a very satisfactory method of packing. If pads were used, flats are omitted

When long eggs are packed in extra-deep fillers to prevent end crush, it is desirable to deepen the cases to relieve the pressure on the eggs. This can be accomplished by nailing 1-inch strips on top of the ends and centerboards. Eggs should always be packed small end down in the fillers, as they carry better in transit and in storage when in that position.

After packing is completed, the top is nailed on with the number of nails indicated in Figure 13. Care must be taken not to nail the cover at the center. The packing will cause a slight bulge at the center of the top which provides some elasticity and is useful in helping to absorb shipping shocks. The case must be plainly labeled with the name and address of the person to whom it is shipped and the name and address of the shipper. Tags or labels should be pasted or nailed on each end of the case rather than on the top, as on the end they are protected by the end cleats.

At the packing house the cases are assembled from the knockdown stock on forms used for this purpose.³ The eggs are packed at the same time that they are candled and graded, being placed in the final shipping cases by the candler. The packing is then completed by other hands. If eggs are shipped in carload lots, it is not necessary to place the name and address of the consignee on each case. Progressive egg packers and cooperative producers' organizations who wish to establish reputations for high-class brands find it to their advantage to stencil their brands on the ends of the cases.

SHIPPING EGGS

BY PARCEL POST

Parcel-post shipment of market eggs is largely a retail practice of producers who furnish eggs at regular intervals in comparatively

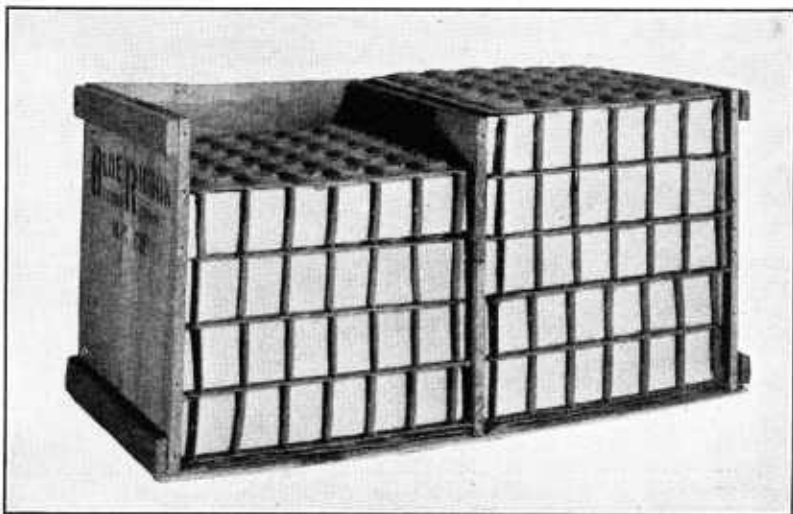


FIGURE 16.—An egg case packed with white spruce fillers and cup flats makes an attractive package, protects the eggs well from breakage, and is a good package for cold storage because of the odorless character of the packing materials

small lots to individual consumers, but cases of eggs are shipped by parcel post from producers and from country shippers to wholesale dealers and retailers. In emergencies when express and freight shipping facilities are tied up, many case shipments may be made by parcel post. Parcel-post shipment of market eggs is generally limited to shipments within the second zone, for it does not pay, as a rule, to ship eggs long distances by this method. Both because the weight of the container is greater per dozen eggs in a small package than in a larger one and because the postage charge for the initial pound is greater than for each subsequent pound, it is more economical to ship eggs by parcel post in lots of more than 1 dozen.

The postage rate is the same to all points within the first and second zones, that is, within a radius of 150 miles from the sending

³ For further information see U. S. Department of Agriculture Leaflet No. 64, The Construction and Packing of an Egg Case.

post office. The rate is 7 cents for the first pound and 1 cent for each additional pound. A simple method of determining the postage on a parcel not going beyond the second zone is to add 6 to the number of pounds which it weighs, the resultant sum being the amount of postage in cents required. Local parcel-post rates are in force and apply to parcels that do not go beyond the jurisdiction of the mailing office and which are lower than the rates for the first and second zones. These rates are 7 cents for the first pound and 1 cent for each additional 2 pounds or fraction thereof. Since few parcel-post shipments of eggs originate and end within the jurisdiction of the same office, producers can not often take advantage of these local rates.

Parcel-post shipments of eggs may be insured against loss or breakage, like other merchandise, and it is usually desirable to insure them. Insured packages are likely to receive more careful handling than those not insured; it is of more importance to the shipper to have the eggs go through without breakage than it is to be able to recover for damage.

BY EXPRESS AND MOTOR TRUCK

Shipments by express are usually in lots of one or several cases. There is an advantage in shipping two or more cases at once since this enables the shipper to take advantage of the 100-pound rate, which is somewhat lower. Because it is more expensive to ship by this means than by freight, express is commonly employed for comparatively short distances. In shipping by express the requirements of the express companies must be carefully studied and complied with; otherwise claims for loss and damage will not be allowed. When express shipments may be made either by day or night, it is preferable to ship at night, especially during hot weather, since night temperatures are more favorable to good quality in the eggs. Whether shipping by express or freight, shippers should see that eggs are not left on the station platform for several hours, exposed to the hot sun, while waiting for a train. Such treatment will cause serious deterioration, particularly in fertile eggs, for the heat is very likely to cause development of the embryo. The eggs should be placed under cover where they will be protected from both sun and rain.

Motor trucks are used extensively in shipping eggs in both small and large lots, and from short distances up to 200 miles or more.

BY FREIGHT

Shipments by freight are usually of two kinds, the local pick-up freight and the through car-lot shipment. The pick-up freight service takes the eggs from the small points in comparatively small lots and delivers them at the packing house or other concentrating point; most of the pick-up work is now being performed by truck. At the concentrating point, after they have been candled, graded, and repacked, the eggs are ready for shipment to their final market. Such shipment should be made, whenever possible, in car lots in refrigerator cars. The eggs should be thoroughly chilled before they are loaded into the car. The car should be iced, except during cool weather, crushed ice without salt being used. The temperature should be reduced below 40° F. before loading is begun.

When the car door is opened for loading, a canvas with a slit in it to allow the passage of the men with the cases should be hung over the door. This will help to retain the cool air and to prevent an undesirable rise of temperature. The egg cases are loaded in rows lengthwise in the car. The usual refrigerator car will accommodate 13 to 15 cases placed end to end lengthwise and 8 rows across. The car is usually loaded not more than four layers deep. Shifting of the load is one of the most serious causes of egg breakage in car-lot shipments.

To prevent shifting, a great deal of care must be taken to see that the cases are loaded tightly against one another and against the ice bunkers at the ends of the car. If it is necessary or desirable to use any buffing at the ends of the car this must be made tight between the cases and the bunker wall.

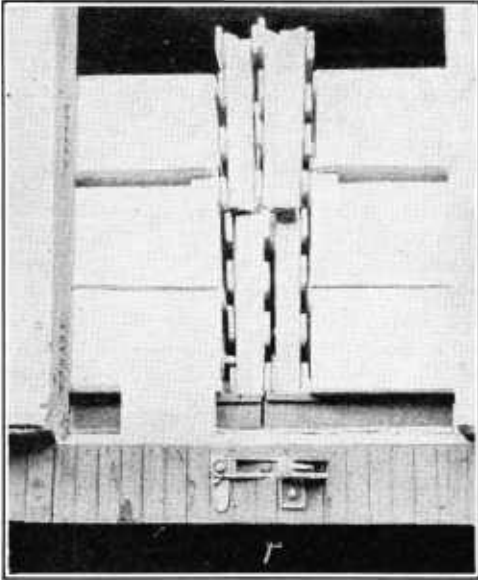


FIGURE 17.—Provision or floor racks in position between cases at center of car. Eight racks were used in this position in this car and were made absolutely tight by wedging pieces of board between them

Wooden frames can be used for buffing. If used at the ends of the car, they are placed tight against the bunker wall, and the cases are placed tight against them. At the center they should be used in the space left between the ends of the cases, one or more frames being faced against the cases forming each end of the load. The frames are then made tight by driving additional frames or wooden braces between them to take up all slack. Floor or provision racks, with which their refriger-

ator cars are equipped, are commonly used by the meat-packing companies to brace egg shipments. (Fig. 17.)

Recently, bracing frames built in the form of wedges have come into use. In using these to fill the space at the center of the load, one wedge-shaped frame is inverted so that its point is down. This is forced down as tightly as possible and, as the load gives in transit, the frame keeps working lower and takes up the space gained, thus keeping the load tight. Frames of this nature are giving excellent satisfaction.

If the car is loaded with an incomplete top layer, the cases of the next lower layer at the end, and along the side of this incomplete layer, should be raised 2 or 3 inches by means of frames set under them. The projecting top edges of these cases will then engage the lower edges of the cases in the incomplete layer and in this way will hold them firmly in place and prevent shifting. (Fig. 17.)

Four hundred cases is generally considered a carload of eggs, although the number actually stowed in a car may be somewhat more or less. Refrigerator cars are reiced on their way to market, as may be necessary or in accordance with the shipper's instructions, at icing stations maintained by the railroad companies. The insulation of the refrigerator car makes it possible to maintain a low temperature in the summer by using ice, and when the cars are used without ice in the winter it protects the eggs from chilling or freezing during severe weather.

It is decidedly preferable to ship eggs in car lots unmixed with other produce. It sometimes becomes necessary, however, to ship part of a carload of eggs together with tubs of butter or with boxes or barrels of dressed poultry. Under these conditions it is necessary to brace the different parts of the load separately and very strongly to prevent damage to the eggs. When dressed poultry is shipped with eggs it is best to load the packages of poultry at the ends of the car next to the ice bunkers and to load the cases of eggs at the center of the car and toward the top of the load. When this is done, the ice used in the bunkers may be salted to produce lower temperatures at the ends of the car and along the floor where the dressed poultry is located. If the ice is salted and the positions of the produce in the load are reversed, eggs next to the bunkers may be frozen, and the poultry at the center of the car may be damaged because of too high temperature at that point.

PRESERVING EGGS

HOME PRESERVATION

Various methods of preserving eggs for household use are employed. Chief among them are the water-glass method and the limewater method. The only use which producers should make of these methods of preservation is in carrying over the summer a supply of cheaper eggs for home use in the fall so that all the higher-priced fresh eggs produced at that time can be sold. Preserved eggs should never be offered for sale by the producer as anything except preserved eggs.

COLD STORAGE⁴

The principal commercial method of preserving eggs is cold storage. Eggs intended for storage should be carefully candled to remove low-quality eggs, cracks, and dirties.

Storage rooms for eggs must be utilized for this purpose exclusively. Other products must not be stored with eggs on account of the danger of imparting undesirable flavors or odors to the eggs. The temperature of an egg-storage room should be maintained within a range of 29° to 32° F.; 30° is the temperature most commonly used. It is important that the temperature be held as even as possible. The humidity should range from 82 to 85 per cent, although slightly higher humidities are now being used, especially where it is possible to secure a good circulation of the air in the storage room. The cases are stacked one upon the other, strips

⁴For more detailed information on the cold storage of eggs see U. S. Department of Agriculture Circular 73, The Cold Storage of Eggs and Poultry.

being used between to allow freer circulation of air. The room itself must be kept sweet and clean. This can be accomplished by liming the floors and by whitewashing the walls after each storage season.

There are various State regulations on the cold storage of eggs. Most of them have to do with the length of time that eggs may be kept in storage, the length of time they may be temporarily held in storage without being termed storage eggs (usually 30 days or less), the marking of cases with the date on which they went into storage and the date when withdrawn, and the sale of cold-storage eggs only as such.

PROCESSING

In recent years a method of treating eggs called "processing," or "shell treating," has been developed, and many market eggs are so treated. The process consists of dipping the eggs for a few seconds into a bath of odorless, tasteless mineral oil heated to a temperature sufficient to insure maximum fluidity of the oil (usually 130° F. or higher). This seals the pores in the shell and thus, to a large extent, prevents evaporation of water from the egg. Some eggs are processed and sold while fresh, but most of those so treated are placed in cold storage. The process is not designed to replace cold storage but rather to improve the keeping quality of cold-storage eggs.

A method of processing eggs in a vacuum has been developed, and results in a more complete sealing of the pores in the shell, but this process is still in an experimental stage.

FREEZING

Among the eggs coming into the packing houses there are always a certain number that are cracked, dirty, or so weak that they will not stand shipment to market. In order to save these eggs some establishments break them out of the shell and freeze them. They can be held frozen for a long time. Formerly only cracked, dirty, or weak eggs were frozen, but under present conditions current receipts of eggs are also broken and frozen when the price is low enough to make this profitable. As the eggs to be frozen are candled they are placed in pails or other containers and carried to the breaking room, which should be well lighted, refrigerated, and maintained at a temperature not over 65° F. It must be built and equipped so that it can be kept clean and sanitary. If the bacterial content of the frozen product is to be kept at a minimum, every precaution must be taken to prevent bacterial contamination of the good eggs by any bad eggs in the breaking stock.

Most of the operators who break out the eggs are girls or women. As broken, each egg is dropped into a glass cup in which it can be inspected, smelled, and sometimes tasted to see that it is suitable for freezing. As soon as two or three good eggs are accumulated in a cup they are emptied into a larger container. If a bad egg is dropped into the cup it is necessary to discard any good eggs which may be in the cup at that time. Any apparatus coming in contact with a bad egg is immediately removed to an adjoining room and thoroughly sterilized before being used again. The eggs, as broken,

may be separated into whites and yolks or may be left mixed. As the broken eggs accumulate they are dumped into a churn in which they are thoroughly agitated so as to secure a uniform mixture. They are then drawn off into their final containers, which are commonly 30-pound cans. These cans are immediately taken to a sharp freezer where a temperature from 0° to -10° F. is maintained, and there the contents are frozen solid. The frozen eggs are held and shipped in this condition and should not be thawed until they are used. Frozen eggs are used principally by bakers and confectioners.

POINTS FOR THE PRODUCER TO REMEMBER IN MARKETING EGGS

Keep strong, healthy, vigorous stock and care for it properly.

Provide plenty of clean nests for the laying hens.

Gather eggs twice a day.

Keep the eggs in a cool, fairly dry place.

Keep out the cracked, dirty, small, and very large eggs for home use.

Never wash eggs unless they are to be used immediately by local trade.

Market eggs frequently, at least once a week and preferably twice.

Know the preferences of your market and strive to meet them.

Grade your eggs for uniformity in size, shape, and color.

Know the shipping requirements of express or railroad companies when you use their services.

Use only sound, strong, standard packages and pack the eggs properly.

Remember that quality is essential for best prices.

If you are selling through a satisfactory agency with which you have established a reputation for high quality, be very sure that you have obtained a better outlet before you make a change.

If you sell to local dealers, insist upon their buying eggs on a "loss-off" or quality basis. •

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